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# मानक

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IS 8436 (1989): Thermal Cycling Test for Evaluation of Electroplated Plastics - Method [MTD 24: Corrosion Protection]



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“Knowledge is such a treasure which cannot be stolen”



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*Indian Standard*

# THERMAL CYCLING TEST FOR EVALUATION OF ELECTROPLATED PLASTICS — METHOD

*( First Revision )*

भारतीय मानक

विद्युत लेपन प्लास्टिक्स के मूल्यांकन के लिए ताप चक्रण परीक्षण — पद्धति

( पहला पुनरीक्षण )

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BUREAU OF INDIAN STANDARDS  
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NEW DELHI 110002

## FOREWORD

This Indian Standard ( First Revision ) was adopted by the Bureau of Indian Standards on 15 September 1989, after the draft finalized by the Metallic and Non-metallic Finishes Sectional Committee had been approved by the Structural and Metals Division Council.

The thermal cycling test is intended primarily to assess adhesion. Temperature fluctuations in service may cause premature adhesion failures and the magnitude of these fluctuations should be taken into consideration when selecting the thermal cycling requirements given in IS 8376 : 1988 'Electroplated coatings of nickel plus chromium on plastics for decorative purposes'. Details of apparatus and thermal cycles are included in this standard.

This standard was first published in 1977. Keeping in view of the latest developments in the field of electroplating on plastics, it was felt necessary to revise this standard to align the test cycle requirements with ISO 4525-1985 ( E ) 'Electroplated coatings of Ni + Cr on plastics materials', prepared by the International Organization for Standardization.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values ( *revised* )'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

## Indian Standard

# THERMAL CYCLING TEST FOR EVALUATION OF ELECTROPLATED PLASTICS — METHOD

( First Revision )

### 1 SCOPE

**1.1** This standard lays down method of thermal cycling test of electroplated plastics for evaluation of serviceability.

### 2 REFERENCES

**2.1** The following Indian Standard is a necessary adjunct to this standard:

IS No.	Title
IS 8376 : 1988	Specification for electroplated coatings of nickel plus chromium on plastics for decorative purposes ( first revision )

### 3 APPARATUS

**3.1** The apparatus shall consist of a circulating air heating chamber and cooling chamber sufficiently insulated, and controlled so as to maintain closely the required temperature. The two chambers may be separate, or may be built so as to constitute a single piece of apparatus. The controller and recorder used for chamber control, calibration and records shall be accurate to  $\pm 1^\circ\text{C}$ . All points within the working area of the test chamber shall remain within  $\pm 2^\circ\text{C}$  of the set temperature when tested by the procedures given in 3.2. The rate of air circulation shall be controlled so as to permit a consistent rate of heating or cooling of the parts under test.

**3.2** Thermocouples may be installed 25 mm from each corner of the test chamber, and each thermocouple should be previously calibrated in boiling water and in ice water.

**NOTE**— Alternatively, oven maintained at particular temperatures may be used in place of the apparatus mentioned above and refrigerator may be used for lower temperatures provided the desired temperatures are maintained.

### 4 SAMPLING

**4.1** The purchaser should select a suitable sampling plan for the acceptance testing of lots of the plated items. The samples should be drawn randomly from the parts as this test is time

consuming and often destructive and therefore, 100 percent inspection may be impractical.

### 5 ELAPSED TIME AFTER PLATING

**5.1** The elapsed time between completion of the plating operation and thermal cycling affects the test results. Therefore, the elapsed time shall be at least 24 hours, unless otherwise agreed to between the purchaser and the seller.

### 6 PROCEDURE

**6.1** The parts may be introduced into the chamber unmounted, or mounted in a manner simulating assembly, if so agreed upon between the purchaser and the seller.

**6.2** The chamber is then loaded with the desired quantity and type of parts to be tested.

**6.3** The location of parts within the chamber, the loading, and the size of the parts being tested, should be recorded.

**6.4** The electroplated sample shall be subjected, not less than 24 hours after plating, to one of the following sets of conditions, according to the thermal cycling requirements indicated in IS 8376 : 1988.

#### 6.4.1 Thermal Cycle A

There shall be four cycles, each cycle consisting of:

The exposure of the coated part for 1 hour at  $75^\circ\text{C}$  and then allow the part to return to  $20 \pm 5^\circ\text{C}$  as quickly as possible and this temperature is maintained for a total soaking period of 1 hour ( minimum ).

#### 6.4.2 Thermal Cycle B

There shall be four cycles, each cycles consisting of:

The exposure of the coated part for 1 hour of  $-20^\circ\text{C}$  and then allow the part to return to  $20 \pm 5^\circ\text{C}$  as quickly as possible and this temperature is maintained for 1 hour ( minimum ).

The exposure of the coated part for 1 hour at 75°C and then allow the part to return to  $20 \pm 5^\circ\text{C}$ , as quickly as possible and this temperature is maintained for 1 hour ( minimum ).

#### 6.4.3 Thermal Cycle C

There shall be four cycles, each cycle consisting of:

The exposure of the coated parts for 1 hour at a temperature of  $-40^\circ\text{C}$ , and then allow the parts to return to  $20 \pm 5^\circ\text{C}$ , as quickly as possible and this temperature is maintained for 1 hour ( minimum ).

The exposure of the coated for 1 hour at  $75^\circ\text{C}$  and then allow the parts to return to  $20 \pm 5^\circ\text{C}$ , as quickly as possible and this temperature is maintained for 1 hour ( minimum ).

## 7 RECORDING OF TEST RESULTS

7.1 The test report shall include the following information:

- a) A statement that this method was followed.
- b) The service grade number, the part was tested for.
- c) The tray construction ( if tray is used ) and chamber loading.
- d) The last calibration date of the controller and the recorder.

7.2 Upon the completion of the test, the part shall be examined and a record made of the extent, nature, and location of any defect as specified in the relevant Indian Standard.

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